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**Remarks/Arguments:**

Applicant wishes to thank the Examiner for her detailed comments. As Examiner has chosen to group her comments by section, Applicant shall address each of these sections and points in turn.

**Amendments to Specification:**

Examiner has stated:

"The abstract of the disclosure is objected to because it is two paragraphs. Correction is required. See MPEP § 608.01(b)."

The currently amended Abstract corrects this problem.

***Claim Rejections - 35 USC § 103***

Examiner has stated:

"Claims 20-24, 26-28 & 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suenaga et al. (USPN 4,301,353) in view of Kerth et al. (USPN 5,544,775).

"Suenaga et al. discloses using a laser beam for forming a slider. The laser beam is scanned (reflected) by the polygon mirror. One shot of the laser is approximately 10 nsec to 1  $\mu$ sec. A beam expander composed of convex lenses and contracted and shaped by a slit magnifies the laser beam. The slider is brought into coincidence with the focusing plane of the optical system. Q-switching is used on the laser. The rotating polygon mirror is a directing device. Suenaga et al. does not teach the use of fluence or the presence of a stage

"Kerth et al. ('775) discloses the making of a high definition, high aspect ratio slider using laser etching. The laser pulse duration is 16 ns and the fluence is substantially 600  $mJ/cm^2$ . Figure 3 shows the slider workpiece (68) mounted on a holder (78).

"It would have been obvious to one of ordinary skill in the art at the time of the invention to note the fluence and use a holder (stage) as taught by Keith et al. ('775) in the Suenaga et al. system because these are merely functional components of a laser etching system."

Independent Claim 20, as currently amended requires:

"a laser which produces a pulsed laser beam for machining the slider material, the laser beam having a pulse width in the range of  $1 \times 10^{-9}$  seconds to  $1 \times 10^{-3}$  seconds, with an

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energy per pulse in the range of 1 to 1,000,000 microJoules, and a repetition rate between 1Hz and 400Hz;"

These parameters of energy, repetition and pulse width are specifically

5 designed for the purpose of producing very high crown and camber in slider materials by creating controlled tensile stress in the flex side of the sliders using variable laser fluence to melt the slider material without over-heating the sensor in it and without tensile stress relief cracks of controlled or preferred orientation.

These limitations were previously included in dependent Claims 38-40, which  
10 have now been included in independent Claim 20, and thus they do not introduce any new matter.

It is apparent that the cited references do not include this combination of limitations, of which only the limitation of "pulse width in the range of  $1 \times 10^{-9}$  seconds to  $1 \times 10^{-3}$  seconds" is addressed here in regard to Claim 38. The further limitations  
15 of "energy per pulse in the range of 1 to 1,000,000 microJoules, and a repetition rate between 1Hz and 400Hz" are addressed in the discussion of Claims 25 and 39-40 below. Thus, this Response will address this combination of limitations as included in the presently amended Claim 20 in regard to the rejection of Claim 25 and 39-40 below.

20

Examiner has stated:

"Claims 25 & 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suenaga et al. and Kerth et al. ('775), as stated in the above paragraph and further in view of Rieger et al. (USPN 5,790,574).

25 "Suenaga et al. and Kerth et al. ('775) do not teach a harmonic, the energy per pulse or the repetition.

30 "Rieger et al. discloses a laser which used for ablation and etching. The average power range is 1 kW. The laser is Q-switched and the system generates about 150 ps at a frequency of 1 kHz. The energy per pulse is 0.6  $\mu$ J. In addition a second harmonic generator may be used. The system also has a steering mirror, a beam expander, and highly reflective mirrors.

"It would have been obvious to one of ordinary skill in the art at the time of

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the invention to use a harmonic, determine the energy per pulse and the system because these are merely standard parameters used in a laser ablation system.

5 Again, independent Claim 20, as currently amended requires:

10 "a laser which produces a pulsed laser beam for machining the slider material, the laser beam having a pulse width in the range of  $1 \times 10^{-9}$  seconds to  $1 \times 10^{-3}$  seconds, with an energy per pulse in the range of 1 to 1,000,000 microJoules, and a repetition rate between 1Hz and 400Hz;"

15 As Examiner has herself pointed out, the *Rieger* reference discloses the use of a laser beam at "about 150 ps at a frequency of 1 kHz. The energy per pulse is 0.6  $\mu$ J." A pico second =  $10^{-12}$  seconds, thus a  $150 \times 10^{-12}$  second pulse width lies outside the range of  $1 \times 10^{-9}$  seconds to  $1 \times 10^{-3}$  seconds required by the amended Claim 20. In addition, *Rieger* operates at 1 kHz, outside the range of 1-400 Hz required by the present invention, and produces a pulse of .6 microJoules, outside the range of 1 to 1,000,000 microJoules, also required by the present invention. Thus, the cited *Rieger* reference does not operate in the range of any of the three required 20 parameters. The *Suenaga* reference discussed above, also does not produce the required parameters.

25 The present inventors have found that the production of very precisely controllable crown in slider material is possible by treatment of the flex side of the slider, when a pulsed laser beam having a combination of several specific parameters is used. These parameters of energy, repetition and pulse width are specifically designed for the purpose of producing very high crown and camber in slider materials by creating controlled tensile stress in the flex side of the sliders using variable laser fluence to melt the slider material without over-heating the sensor in it and without tensile stress relief cracks of controlled or preferred 30 orientation. These sensors are very delicate mechanisms and can be easily

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damaged by the inappropriate application of laser energy. It required considerable experimentation to design the apparatus to produce appropriate fluence as determined by these energy pulse parameters, and one skilled in the art could not easily produce such an apparatus without much experimentation. Thus the present  
5 invention cannot be fairly said to be obvious in view of the cited prior art.

In addition, it cannot be fairly said that the present invention is obvious in view of the cited prior art because the prior art does not address the same problem addressed by the current invention. In order to have a proper motivation to combine the cited references, there must be some appreciation of the problem,  
10 which is not demonstrated in the cited prior art.

Thus it cannot be fairly said that the present invention is made obvious by the cited references, either alone or in combination.

Thus, applicant respectfully asserts that the present invention is not obvious  
15 in view of the cited references. Applicant respectfully requests that the rejection be withdrawn and Claim 20 be allowed, and dependent claims 21-29 be allowed.

Examiner has further stated:

20 "Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suenaga et al. and Kerth et al. ('775), as stated in the above paragraph and further in view of Kerth et al. (USPN 5,739,048).

Suenaga et al. and Kerth et al. ('775) do not teach producing multiple sliders in the system.

25 "Keith et al. ('048) discloses forming rows of sliders which are partial cut following fabrication which allows easy inspection and packing, but allows for easy separation of the completed slider just prior to assembly.

It would have been obvious to form multiple sliders as taught by Kerth et al. ('048) in the Suenaga et al. and Keith et al. ('775) system because of the  
30 enhanced manufacturing efficiency."

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Claim 29 is dependent on Claim 20, and includes by it dependence the assertedly non-obvious features

5       “a laser which produces a pulsed laser beam for machining the slider material, the laser beam having a pulse width in the range of  $1 \times 10^{-9}$  seconds to  $1 \times 10^{-3}$  seconds, with an energy per pulse in the range of 1 to 1,000,000 microJoules, and a repetition rate between 1Hz and 400Hz,”

10      of the present invention. Therefore, Applicant respectfully asserts that this claim is also not made obvious by the cited references, either alone or in combination.

Applicant therefore respectfully requests that the rejection be withdrawn and all Claims 20-29 remaining in the case be allowed.

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**Conclusion:**

5       Applicant has endeavored to put this case into complete condition for allowance. It is thought that the current amendments have corrected the problems with the Abstract. It is thought that the claims as currently amended cannot be fairly said to be obvious over the cited references. Applicant therefore respectfully asks that the objection and rejections be withdrawn and that allowance of all claims  
10 presently in the case now be granted.

If the Examiner would like to discuss any of the points involved in the Response, he is urged to contact Applicant's Attorney at the numbers included below.

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Respectfully Submitted,

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